



Attorney Docket No.: PRMG-04578

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Michael R. Slater, et al.

Serial No.:

09/641,319

Group No.:

Filed:

08/18/00

Examiner:

Entitled:

**Mutant TNE Polymerases** 

# CERTIFICATE RE: SEQUENCE LISTING

Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450

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Sugan M. McClintock

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Dated: 11/12/03

By:

: \_

David A. Casimir

Registration No. 42,395

MEDLEN & CARROLL, LLP 101 Howard Street, Suite 350 San Francisco, California 94105 608/218-6900

# HOV 1 4 2003 TO

## SEQUENCE LISTING

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Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu
aca ctg gtg ctg tcg aag ttg aaa gag atc ctc gaa gac ccg tct tcg
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Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser
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Lys	Ser	Thr	Tyr	Ile 325	Asp	Thr	Leu	Pro	Lys 330	Leu	Val	Asn	Pro	Lys 335	Thr
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		Gly ggg														720
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		gag Glu												Lys		816
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		tac Tyr														912
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Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser 85 90 95

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Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser 145 150 155 160

Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp 165 170 175

Lys Ala Ala Asn Tyr Ser Cys Glu Asn Ala Asp Ile Thr Tyr Arg Leu 180 185 190

Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val 195 200 205

Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu 210 215 220

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Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val
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	ggt cag aac Gly Gln Asn 100	Leu Lys Ty			Met Val	336
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Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala 115 120 125

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Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile 260 265 270

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Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu 290 295 300

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Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu 225 230 230

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Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile 260 265 270

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Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu 290 295 300

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Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr 325

Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg 340 345 350

Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu 355 360 365

Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp 370 375 380

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His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile 405 410 415

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ttt Phe 465	e Gly	a aga 7 Arg	a aaa g Lys	aga S Arg	a gat g Asp 470	) Ile	cco Pro	c cag o Gli	g cto n Le	ato 1 Med 47	CAL	a agg	g gad g Asi	c aag o Lys	g aac s Asn 480	1440

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Met Thr Ser Tyr Gln Glu Leu Met Ser Phe Ser Ser Pro Leu Phe Gly 125

Phe Ser Phe Ala Asp Val Pro Val Asp Lys Ala Ala Asn Tyr Ser Cys

Glu Asp Ala Asp Ile Thr Tyr Arg Leu Tyr Lys Ile Leu Ser Met Lys 145 150 150 160

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Leu His Glu Ala Glu Leu Glu Asn Val Phe Tyr Arg Ile Glu Met Pro 165 170 175

Leu Val Asn Val Leu Ala Arg Met Glu Leu Asn Gly Val Tyr Val Asp 180 185 190

Thr Glu Phe Leu Lys Lys Leu Ser Glu Glu Tyr Gly Lys Lys Leu Glu 195 200 205

Glu Leu Ala Glu Lys Ile Tyr Gln Ile Ala Gly Glu Pro Phe Asn Ile 210 215 220

Asn Ser Pro Lys Gln Val Ser Lys Ile Leu Phe Glu Lys Leu Gly Ile 225 230 235

Lys Pro Arg Gly Lys Thr Thr Lys Thr Gly Ala Tyr Ser Thr Arg Ile 245 250 255

Glu Val Leu Glu Glu Ile Ala Asn Glu His Glu Ile Val Pro Leu Ile 260 265 270

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His Gln Thr Gly Thr Ala Thr Gly Arg Leu Ser Ser Ser Asp Pro Asn 305 310 315 320

Leu Gln Asn Leu Pro Thr Lys Ser Glu Glu Gly Lys Glu Ile Arg Lys 325 330 335

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Ser Gln Ile Glu Leu Arg Ile Leu Ala His Leu Ser Gly Asp Glu Asn 355 360 365

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Tyr Gly Leu Ser Val Arg Leu Gly Ile Pro Val Lys Glu Ala Glu Lys 420 425 430

Met Ile Ile Ser Tyr Phe Thr Leu Tyr Pro Lys Val Arg Ser Tyr Ile 435 440 445

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Phe Gly Arg Lys Arg Asp Ile Pro Gln Leu Met Ala Arg Asp Lys Asn 465 470 475 480

Thr Gln Ser Glu Gly Glu Arg Ile Ala Ile Asn Thr Pro Ile Gln Gly 485 490 495

Thr Ala Ala Asp Ile Ile Lys Leu Ala Met Ile Asp Ile Asp Glu Glu 500 505 510

Leu Arg Lys Arg Asn Met Lys Ser Arg Met Ile Ile Gln Val His Asp 515 520 525

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ccc Pro	cto Leu	att Ile 195	: Lev	gag Glu	g tac ı Tyr	aga Arg	aac J Lys 200	3 11€	c cag e Glr	g aaa n Lys	cto Lev	g aaa 1 Lys 205	Ser	acc Thr	tac Tyr	624
ata Ile	gac Asp 210	Thr	ctt Lev	ccg Pro	g aaa Lys	ctt Leu 215	ı Val	g aac Asr	c ccg	g aaa o Lys	a acc Thi 220	r Gry	aga Arg	att J Ile	cat His	672

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Leu	Gly	·Ile	Lys	Pro 165		Gly	Lys	Thr	Thr 170	Lys	Thr	Gly	Ala	Tyr 175	Ser

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Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr Gly Arg Ile His 210 215 220

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Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu Glu Gly Lys Glu 245 250 255

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Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile Asp Val His Thr 290 295 300

Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu Glu Val Asn Glu 305 310 315 320

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Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile Pro Val Lys Glu 340 345 350

Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr Pro Lys Val Arg 355 360 365

Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu Lys Gly Tyr Val 370 375 380

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<212> PRT

<213> Escherichia coli

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Met Val Gln Ile Pro Gln Asn Pro Leu Ile Leu Val Asp Gly Ser Ser 1 5 10 15

Tyr Leu Tyr Arg Ala Tyr His Ala Phe Pro Pro Leu Thr Asn Ser Ala 20 25 30

Gly Glu Pro Thr Gly Ala Met Tyr Gly Val Leu Asn Met Leu Arg Ser 35 40 45

Leu Ile Met Gln Tyr Lys Pro Thr His Ala Ala Val Val Phe Asp Ala 50 55 60

Lys Gly Lys Thr Phe Arg Asp Glu Leu Phe Glu His Tyr Lys Ser His 65 70 75 80

Arg Pro Pro Met Pro Asp Asp Leu Arg Ala Gln Ile Glu Pro Leu His 85 90 95

Ala Met Val Lys Ala Met Gly Leu Pro Leu Leu Ala Val Ser Gly Val

Glu Ala Asp Asp Val Ile Gly Thr Leu Ala Arg Glu Ala Glu Lys Ala 115 120 125

Gly Arg Pro Val Leu Ile Ser Thr Gly Asp Lys Asp Met Ala Gln Leu 130 135 140

Val Thr Pro Asn Ile Thr Leu Ile Asn Thr Met Thr Asn Thr Ile Leu 145 150 155 160

Gly	Pro	Glu	Glu	Val 165	Val	Asn	Lys	Tyr	Gly 170	Val	Pro	Pro	Glu	Leu 175	Ile
Ile	Asp	Phe	Leu 180	Ala	Leu	Met	Gly	Asp 185	Ser	Ser	Asp	Asn	Ile 190	Pro	Gly
Val	Pro	Gly 195	Val	Gly	Glu	Lys	Thr 200	Ala	Gln	Ala	Leu	Leu 205	Gln	Gly	Leu
Gly	Gly 210	Leu	Asp	Thr	Leu	Tyr 215	Ala	Glu	Pro	Glu	Lys 220	Ile	Ala	Gly	Leu
Ser 225	Phe	Arg	Gly	Ala	Lys 230	Thr	Met	Ala	Ala	Lys 235	Leu	Glu	Gln	Asn	Lys 240
Glu	Val	Ala	Tyr	Leu 245	Ser	Tyr	Gln	Leu	Ala 250	Thr	Ile	Lys	Thr	Asp 255	Val
Glu	Leu	Glu	Leu 260	Thr	Cys	Glu	Gln	Leu 265	Glu	Val	Gln	Gln	Pro 270	Ala	Ala
Glu	Glu	Leu 275	Leu	Gly	Leu	Phe	Lys 280	Lys	Tyr	Glu	Phe	Lys 285	Arg	Trp	Thr
Ala	Asp 290	Val	Glu	Ala	Gly	Lys 295	Trp	Leu	Gln	Ala	Lys 300	Gly	Ala	Lys	Pro
Ala 305		Lys	Pro	Gln	Glu 310		Ser	Val	Ala	Asp 315		Ala	Pro	Glu	Val 320
Thr	Ala	Thr	Val	Ile 325	Ser	Tyr	Asp	Asn	Tyr 330	Val	Thr	Ile	Leu	Asp 335	Glu
Glu	Thr	Leu	Lys 340	Ala	Trp	Ile	Ala	Lys 345	Leu	Glu	Lys	Ala	Pro 350	Val	Phe
Ala	Phe	Asp 355	Thr	Glu	Thr	Asp	Ser 360	Leu	Asp	Asn	Ile	Ser 365	Ala	Asn	Leu
Val	Gly 370	Leu	Ser	Phe	Ala	Ile 375	Glu	Pro	Gly	Val	Ala 380	Ala	Tyr	Ile	Pro
Val 385	Ala	His	Asp	Tyr	Leu 390	Asp	Ala	Pro	Asp	Gln 395	Ile	Ser	Arg	Glu	Arg 400
Ala	Leu	Glu	Leu	Leu 405	Lys	Pro	Leu	Leu	Glu 410	Asp	Glu	Lys	Ala	Leu 415	Lys

- Val Gly Gln Asn Leu Lys Tyr Asp Arg Gly Ile Leu Ala Asn Tyr Gly 420 425 430
- Ile Glu Leu Arg Gly Ile Ala Phe Asp Thr Met Leu Glu Ser Tyr Ile 435 440 445
- Leu Asn Ser Val Ala Gly Arg His Asp Met Asp Ser Leu Ala Glu Arg 450 455 460
- Trp Leu Lys His Lys Thr Ile Thr Phe Glu Glu Ile Ala Gly Lys Gly 465 470 475 480
- Lys Asn Gln Leu Thr Phe Asn Gln Ile Ala Leu Glu Glu Ala Gly Arg 485 490 495
- Tyr Ala Ala Glu Asp Ala Asp Val Thr Leu Gln Leu His Leu Lys Met 500 505 510
- Trp Pro Asp Leu Gln Lys His Lys Gly Pro Leu Asn Val Phe Glu Asn 515 520 525
- Ile Glu Met Pro Leu Val Pro Val Leu Ser Arg Ile Glu Arg Asn Gly 530 535 540
- Val Lys Ile Asp Pro Lys Val Leu His Asn His Ser Glu Glu Leu Thr 545 550 555 560
- Leu Arg Leu Ala Glu Leu Glu Lys Lys Ala His Glu Ile Ala Gly Glu 565 570 575
- Glu Phe Asn Leu Ser Ser Thr Lys Gln Leu Gln Thr Ile Leu Phe Glu 580 585 590
- Lys Gln Gly Ile Lys Pro Leu Lys Lys Thr Pro Gly Gly Ala Pro Ser
- Thr Ser Glu Glu Val Leu Glu Glu Leu Ala Leu Asp Tyr Pro Leu Pro 610 620
- Lys Val Ile Leu Glu Tyr Arg Gly Leu Ala Lys Leu Lys Ser Thr Tyr 625 630 635 640

Thr Asp Lys Leu Pro Leu Met Ile Asn Pro Lys Thr Gly Arg Val His
645 650 655

Thr Ser Tyr His Gln Ala Val Thr Ala Thr Gly Arg Leu Ser Ser Thr 660 665 670 .

Asp Pro Asn Leu Gln Asn Ile Pro Val Arg Asn Glu Glu Gly Arg Arg 675 680 685

Ile Arg Gln Ala Phe Ile Ala Pro Glu Asp Tyr Val Ile Val Ser Ala 690 695 700

Asp Tyr Ser Gln Ile Glu Leu Arg Ile Met Ala His Leu Ser Arg Asp 705 710 715 720

Lys Gly Leu Leu Thr Ala Phe Ala Glu Gly Lys Asp Ile His Arg Ala 725 730 735

Thr Ala Ala Glu Val Phe Gly Leu Pro Leu Glu Thr Val Thr Ser Glu 740 745 750

Gln Arg Arg Ser Ala Lys Ala Ile Asn Phe Gly Leu Ile Tyr Gly Met 755 760 765

Ser Ala Phe Gly Leu Ala Arg Gln Leu Asn Ile Pro Arg Lys Glu Ala 770 780

Gln Lys Tyr Met Asp Leu Tyr Phe Glu Arg Tyr Pro Gly Val Leu Glu
785 790 795 800

Tyr Met Glu Arg Thr Arg Ala Gln Ala Lys Glu Gln Gly Tyr Val Glu 805 810 815

Thr Leu Asp Gly Arg Arg Leu Tyr Leu Pro Asp Ile Lys Ser Ser Asn 820 825 830

Gly Ala Arg Arg Ala Ala Ala Glu Arg Ala Ala Ile Asn Ala Pro Met 835 840 845

Gln Gly Thr Ala Ala Asp Ile Ile Lys Arg Ala Met Ile Ala Val Asp 850 855 860

Ala Trp Leu Gln Ala Glu Gln Pro Arg Val Arg Met Ile Met Gln Val 865 870 875 880

His Asp Glu Leu Val Phe Glu Val His Lys Asp Asp Val Asp Ala Val 885 890 895 Ala Lys Gln Ile His Gln Leu Met Glu Asn Cys Thr Arg Leu Asp Val 900 905 910

Pro Leu Leu Val Glu Val Gly Ser Gly Glu Asn Trp Asp Gln Ala His 915 920 925

<210> 74

<211> 893

<212> PRT

<213> Thermotoga maritima

<400> 74

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Asn Ala Thr Tyr Gly Val Ala Arg Met Leu Val Arg Phe Ile Lys Asp 35 40 45

His Ile Ile Val Gly Lys Asp Tyr Val Ala Val Ala Phe Asp Lys Lys 50 55 60

Ala Ala Thr Phe Arg His Lys Leu Leu Glu Thr Tyr Lys Ala Gln Arg 65 70 75 80

Pro Lys Thr Pro Asp Leu Leu Ile Gln Gln Leu Pro Tyr Ile Lys Lys 85 90 95

Leu Val Glu Ala Leu Gly Met Lys Val Leu Glu Val Glu Gly Tyr Glu
100 105 110

Ala Asp Asp Ile Ile Ala Thr Leu Ala Val Lys Gly Leu Pro Leu Phe 115 120 125

Asp Glu Ile Phe Ile Val Thr Gly Asp Lys Asp Met Leu Gln Leu Val 130 135 140

Asn Glu Lys Ile Lys Val Trp Arg Ile Val Lys Gly Ile Ser Asp Leu 145 150 150 160

Glu Leu Tyr Asp Ala Gln Lys Val Lys Glu Lys Tyr Gly Val Glu Pro 165 170 175

Gln Gln Ile Pro Asp Leu Leu Ala Leu Thr Gly Asp Glu Ile Asp Asn 180 185 190

- Ile Pro Gly Val Thr Gly Ile Gly Glu Lys Thr Ala Val Gln Leu Leu 195 200 205

  Glu Lys Tyr Lys Asp Leu Glu Asp Ile Leu Asn His Val Arg Glu Leu
- Pro Gln Lys Val Arg Lys Ala Leu Leu Arg Asp Arg Glu Asn Ala Ile
  225 230 235 240
- Leu Ser Lys Lys Leu Ala Ile Leu Glu Thr Asn Val Pro Ile Glu Ile 245 250 255
- Asn Trp Glu Glu Leu Arg Tyr Gln Gly Tyr Asp Arg Glu Lys Leu Leu 260 265 270
- Pro Leu Lys Glu Leu Glu Phe Ala Ser Ile Met Lys Glu Leu Gln 275 280 285
- Leu Tyr Glu Glu Ser Glu Pro Val Gly Tyr Arg Ile Val Lys Asp Leu 290 295 300
- Val Glu Phe Glu Lys Leu Ile Glu Lys Leu Arg Glu Ser Pro Ser Phe 305 310 315 320
- Ala Ile Asp Leu Glu Thr Ser Ser Leu Asp Pro Phe Asp Cys Asp Ile 325 330 335
- Val Gly Ile Ser Val Ser Phe Lys Pro Lys Glu Ala Tyr Tyr Ile Pro 340 345 350
- Leu His His Arg Asn Ala Gln Asn Leu Asp Glu Lys Glu Val Leu Lys 355 360 365
- Lys Leu Lys Glu Ile Leu Glu Asp Pro Gly Ala Lys Ile Val Gly Gln 370 375 380
- Asn Leu Lys Phe Asp Tyr Lys Val Leu Met Val Lys Gly Val Glu Pro 385 390 395 400
- Val Pro Pro Tyr Phe Asp Thr Met Ile Ala Ala Tyr Leu Leu Glu Pro 405 410 415

Asn Glu Lys Lys Phe Asn Leu Asp Asp Leu Ala Leu Lys Phe Leu Gly 425 Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser Phe Ser Phe Pro Leu 435 Phe Gly Phe Ser Phe Ala Asp Val Pro Val Glu Lys Ala Ala Asn Tyr 450 Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu Tyr Lys Thr Leu Ser 470 Leu Lys Leu His Glu Ala Asp Leu Glu Asn Val Phe Tyr Lys Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu Leu Asn Gly Val Tyr 500 505 Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Glu Ile Tyr Arg Ile Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Arg Ile Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr Gly Asp Tyr Ser Thr 575 Arg Ile Glu Val Leu Glu Glu Leu Ala Gly Glu His Glu Ile Ile Pro 580 Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu Lys Ser Thr Tyr Ile 595 Asp Ala Leu Pro Lys Met Val Asn Pro Lys Thr Gly Arg Ile His Ala 615 610 Ser Phe Asn Gln Thr Gly Thr Ala Thr Gly Arg Leu Ser Ser Ser Asp 625 630 Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu Glu Gly Lys Glu Ile 645 Arg Lys Ala Ile Val Pro Gln Asp Pro Asn Trp Trp Ile Val Ser Ala 665 660

Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala His Leu Ser Gly Asp 675 680 Glu Asn Leu Leu Arg Ala Phe Glu Glu Gly Ile Asp Val His Thr Leu Thr Ala Ser Arg Ile Phe Asn Val Lys Pro Glu Glu Val Thr Glu Glu 715 Met Arg Arg Ala Gly Lys Met Val Asn Phe Ser Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Val Pro Val Lys Glu Ala 745 Glu Lys Met Ile Val Asn Tyr Phe Val Leu Tyr Pro Lys Val Arg Asp 755 Tyr Ile Gln Arg Val Val Ser Glu Ala Lys Glu Lys Gly Tyr Val Arg 770 Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln Leu Met Ala Arg Asp 785 Arg Asn Thr Gln Ala Glu Gly Glu Arg Ile Ala Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala Met Ile Glu Ile Asp 825 820 Arg Glu Leu Lys Glu Arg Lys Met Arg Ser Lys Met Ile Ile Gln Val 840 His Asp Glu Leu Val Phe Glu Val Pro Asn Glu Glu Lys Asp Ala Leu Val Glu Leu Val Lys Asp Arg Met Thr Asn Val Val Lys Leu Ser Val

Pro Leu Glu Val Asp Val Thr Ile Gly Lys Thr Trp Ser

885

- <210> 75
- <211> 893
- <212> PRT
- <213> Thermotoga neapolitana
- <400> 75
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- Tyr Tyr Ala Leu Asp Arg Ser Leu Ser Thr Ser Thr Gly Ile Pro Thr 20 25 30
- Asn Ala Val Tyr Gly Val Ala Arg Met Leu Val Lys Phe Ile Lys Glu 35 40 45
- His Ile Ile Pro Glu Lys Asp Tyr Ala Ala Val Ala Phe Asp Lys Lys 50 55 60
- Ala Ala Thr Phe Arg His Lys Leu Leu Glu Ala Tyr Lys Ala Gln Arg 65 70 75 80
- Pro Lys Thr Pro Asp Leu Leu Val Gln Gln Leu Pro Tyr Ile Lys Arg 85 90 95
- Leu Ile Glu Ala Leu Gly Phe Lys Val Leu Glu Leu Glu Gly Tyr Glu 100 105 110
- Ala Asp Asp Ile Ile Ala Thr Leu Ala Val Lys Gly Cys Thr Phe Phe 115 120 125
- Asp Glu Ile Phe Ile Ile Thr Gly Asp Lys Asp Met Leu Gln Leu Val
- Asn Glu Lys Ile Lys Val Trp Arg Ile Val Lys Gly Ile Ser Asp Leu 145 150 155 160
- Glu Leu Tyr Asp Ser Lys Lys Val Lys Glu Arg Tyr Gly Val Glu Pro 165 170 175
- His Gln Ile Pro Asp Leu Leu Ala Leu Thr Gly Asp Glu Ile Asp Asn 180 185 190
- Ile Pro Gly Val Thr Gly Ile Gly Glu Lys Thr Ala Val Gln Leu Leu 195 200 205
- Gly Lys Tyr Arg Asn Leu Glu Asp Ile Leu Glu His Ala Arg Glu Leu 210 215 220

225	GIN	Arg	vaı	Arg	230	Ата	Leu	Leu	Arg	235	Arg	GIU	Val	Ald	240
Leu	Ser	Lys	Lys	Leu 245	Ala	Thr	Leu	Val	Thr 250	Asn	Ala	Pro	Val	Glu 255	Val
Asp	Trp	Glu	Glu 260	Met	Lys	Tyr	Arg	Gly 265	Tyr	Asp	Lys	Arg	Lys 270	Leu	Leu
Pro	Ile	Leu 275	Lys	Glu	Leu	Glu	Phe 280	Ala	Ser	Ile	Met	Lys 285	Glu	Leu	Gln
Leu	Tyr 290	Glu	Glu	Ala	Glu	Pro 295	Thr	Gly	Tyr	Glu	Ile 300	Val	Lys	Asp	His
Lys 305	Thr	Phe	Glu	Asp	Leu 310	Ile	Glu	Lys	Leu	Lys 315	Glu	Val	Pro	Ser	Phe 320
Ala	Leu	Asp	Leu	Glu 325	Thr	Ser	Ser	Leu	Asp 330	Pro	Phe	Asn	Cys	Glu 335	Ile
Val	Gly	Ile	Ser 340	Val	Ser	Phe	Lys	Pro 345	Lys	Thr	Ala	Tyr	Tyr 350	Ile	Pro
Leu	His	His 355	Arg	Asn	Ala	Gln	Asn 360	Leu	Asp	Glu	Thr	Leu 365	Val	Leu	Ser
Lys	Leu 370	Lys	Glu	Ile	Leu	Glu 375	Asp	Pro	Ser	Ser	Lys 380	Ile	Val	Gly	Gln
Asn 385	Leu	Lys	Tyr	Asp	Tyr 390	Lys	Val	Leu	Met	Val 395	Lys	Gly	Ile	Ser	Pro 400
Val	Tyr	Pro	His	Phe 405	Asp	Thr	Met	Ile	Ala 410	Ala	Tyr	Leu	Leu	Glu 415	Pro
Asn	Glu	Lys	Lys 420	Phe	Asn	Leu	Glu	Asp 425	Leu	Ser	Leu	Lys	Phe 430	Leu	Gly
_	_	435			-		440					445		Pro	
	450					455				_	460			Asn	_
Ser 465	Cys	Glu	Asp	Ala	Asp 470	Ile	Thr	Tyr	Arg	Leu 475	Tyr	Lys	Ile	Leu	Ser 480

- Met Lys Leu His Glu Ala Glu Leu Glu Asn Val Phe Tyr Arg Ile Glu 485 490 495
- Met Pro Leu Val Asn Val Leu Ala Arg Met Glu Leu Asn Gly Val Tyr 500 505 510
- Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu Glu Tyr Gly Lys Lys 515 520 525
- Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile Ala Gly Glu Pro Phe 530 540
- Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile Leu Phe Glu Lys Leu 545 550 555 560
- Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr Gly Ala Tyr Ser Thr 565 570 575
- Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu His Glu Ile Val Pro 580 585 590
- Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu Lys Ser Thr Tyr Ile 595 600 605
- Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr Gly Arg Ile His Ala 610 615 620
- Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg Leu Ser Ser Ser Asp 625 630 635 640
- Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu Glu Gly Lys Glu Ile 645 650 655
- Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp Trp Ile Val Ser Ala 660 665 670
- Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala His Leu Ser Gly Asp 675 680 685
- Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile Asp Val His Thr Leu 690 695 700

705	Ala	Ser	Arg	He	Tyr 710	Asn	Val	Lys	Pro	715	Glu	vaı	Asn	Glu	720
Met	Arg	Arg	Val	Gly 725	Lys	Met	Val	Asn	Phe 730	Ser	Ile	Ile	Tyr	Gly 735	Val
Thr	Pro	Tyr	Gly 740	Leu	Ser	Val	Arg	Leu 745	Gly	Ile	Pro	Val	Lys 750	Glu	Ala
Glu	Lys	Met 755	Ile	Ile	Ser	Tyr	Phe 760	Thr	Leu	Tyr	Pro	Lys 765	Val	Arg	Ser
Tyr	Ile 770	Gln	Gln	Val	Val	Ala 775	Glu	Ala	Lys	Glu	Lys 780	Gly	Tyr	Val	Arg
Thr 785	Leu	Phe	Gly	Arg	Lys 790	Arg	Asp	Ile	Pro	Gln 795	Leu	Met	Ala	Arg	Asp 800
Lys	Asn	Thr	Gln	Ser 805	Glu	Gly	Glu	Arg	Ile 810	Ala	Ile	Asn	Thr	Pro 815	Ile
Gln	Gly	Thr	Ala 820	Ala	Asp	Ile	Ile	Lys 825	Leu	Ala	Met	Ile	Asp 830	Ile	Asp
Glu	Glu	Leu 835	Arg	Lys	Arg	Asn	Met 840	Lys	Ser	Arg	Met	Ile 845	Ile	Gln	Val
His	Asp 850	Glu	Leu	Val	Phe	Glu 855	Val	Pro	Asp	Glu	Glu 860	Lys	Glu	Glu	Leu
Val 865	Asp	Leu	Val	Lys	Asn 870	Lys	Met	Thr	Asn	Val 875	Val	Lys	Leu	Ser	Val 880
Pro	Leu	Glu	Val	Asp 885	Ile	Ser	Ile	Gly	Lys 890	Ser	Trp	Ser			